WHAT IS CLAIMED IS:

1. A manufacturing method of a semiconductor device, comprising the steps of:

(a) preparing a semiconductor wafer having a first principal plane on which an element is formed and a second principal plane opposite to said first principal plane;

b) forming a protective film on said second principal plane only of said semiconductor wafer;

(c) forming a gate insulating film on said first principal plane, after the step (b); and

(d) forming a conductor layer on said gate insulating film.

2. A manufacturing method of a semiconductor device according to claim 1, wherein said gate insulating film in the step (c) is formed by subjecting said first principal plane to thermal oxidation, with said gate insulating film of said semiconductor wafer mounted on a support in first apparatus.

3. A manufacturing method of a semiconductor device according to claim 1, wherein the step (d) comprises the steps of:

(d1) mounting said semiconductor wafer on a support in second apparatus, so that said second principal plane having said protective film formed thereon comes in contact with the support, and forming a conductive film on said gate insulating film by using a chemical vapor deposition method; and

(d2) etching said conductive film into a predetermined

pattern.

4. A manufacturing method of a semiconductor device according to claim 3, wherein said etching is performed under a plasma atmosphere.

5. A manufacturing method of a semiconductor device according to claim 1, comprising a step of cleaning said semiconductor wafer, after the step (b).

6. A manufacturing method of a semiconductor device according to claim 1, further comprising the steps of:

forming a photoresist film pattern on said first principal plane of said semiconductor wafer, after the step (b) and before the step (c);

forming trenches for element isolation on said first principal plane, using said photoresist film pattern as a mask; and

removing said photoresist film pattern under a plasma atmosphere.

7. A manufacturing method of a semiconductor device according to claim 1, further comprising the steps of:

forming trenches for element isolation on said first principal plane, prior to the step (b), and

burying an insulating film in said trenches.

8. A manufacturing method of a semiconductor device according to claim 1, wherein said semiconductor wafer has a diameter of about 300 mm.

9. A manufacturing method of a semiconductor device according to claim 1, wherein said first principal plane and said second principal plane of said semiconductor wafer in the step (a) have been subjected to mirror finishing.

10. A manufacturing method of a semiconductor device, comprising the steps of:

(a) preparing a semiconductor wafer having a first principal plane on which an element is formed and a second principal plane opposite to said first principal plane;

(b) forming a gate insulating film on said first principal plane;

(c) forming a conductive film on said gate insulating film;

(d) after the step (c), forming a protective film on said second principal plane of said semiconductor wafer, with said first principal plane of said semiconductor wafer placed on a support in first apparatus; and

(e) etching said conductive film to form a gate electrode.

11. A manufacturing method of a semiconductor device according to claim 10, wherein said gate insulating film in the step (b) is formed by subjecting said first principal plane to

thermal oxidation.

12. A manufacturing method of a semiconductor device according to claim 10, wherein after the step (c), said conductive film is selectively etched under a plasma atmosphere, to form said gate electrode.

13. A manufacturing method of a semiconductor device according to claim 10, comprising a step of cleaning said semiconductor wafer, after the step (b).

14. A manufacturing method of a semiconductor device according to claim 10, further comprising the steps of:

forming a photoresist film pattern on said first principal plane of said semiconductor wafer, before forming said protective film;

forming trenches for element isolation on said first principal plane, using said photoresist film pattern as a mask; and

removing said photoresist film pattern under a plasma atmosphere.

15. A manufacturing method of a semiconductor device according to claim 11, wherein said gate insulating film in the step (b) is formed by subjecting said first principal plane to thermal oxidation, and then to oxynitride processing.

16. A manufacturing method of a semiconductor device according to claim 10, wherein said semiconductor wafer has a diameter of not smaller than 300 mm.

17. A manufacturing method of a semiconductor device according to claim 10, wherein said first principal plane and said second principal plane of said semiconductor wafer have been subjected to mirror finishing.

18. A manufacturing method of a semiconductor device, comprising the steps of:

(a) preparing a semiconductor wafer having a first principal plane on which an element is formed and a second principal plane opposite to said first principal plane;

(b) forming a protective film on said second principal plane of said semiconductor wafer, with said first principal plane of said semiconductor wafer placed on a support in first apparatus;

(c) forming a metal or a metallic compound on said first principal plane, after the step (b); and

(d) cleaning said second principal plane of said semiconductor wafer, after the step (c).

19. A manufacturing method of a semiconductor device according to claim 18, wherein the step (c) is a step of forming a copper film on said first principal plane.

20. A manufacturing method of a semiconductor device according to claim 19, wherein said copper film is formed by plating.

21. A manufacturing method of a semiconductor device, comprising the steps of:

(a) preparing a semiconductor wafer having a first principal plane on which an element is formed and a second principal plane opposite to said first principal plane, and having a diameter of about 300 mm or not smaller than 300 mm;

(b) allowing a film to be formed so as to cover said second principal plane of said semiconductor wafer;

(c) mounting said semiconductor wafer on a susceptor in a single wafer processing unit so that the film on said second principal plane comes in contact with the susceptor; and

(d) processing said first principal plane of said semiconductor wafer by said single wafer processing unit.

22. A manufacturing method of a semiconductor device according to claim 21, wherein said first principal plane and said second principal plane of said semiconductor wafer have been subjected to mirror finishing.

23. A manufacturing method of a semiconductor device according to claim 22, wherein said mirror-finished first and second principal planes have a brightness of 80% or more.

24. A manufacturing method of a semiconductor device according to claim 22, wherein said mirror-finished first and second principal planes have a brightness of from 60% to 100% inclusive.

25. A manufacturing method of a semiconductor device according to claim 22, wherein said mirror-finished second principal planes is rougher than said first principal plane.

26. A manufacturing method of a semiconductor device according to claim 21, wherein said film is an insulating film formed by the CVD method.

27. A manufacturing method of a semiconductor device according to claim 26, wherein said insulating film includes an oxide film.

28. A manufacturing method of a semiconductor device, comprising the steps of:

(a) preparing a semiconductor wafer having a first principal plane and a second principal plane opposite to said first principal plane, and having a diameter of about 300 mm or not smaller than 300 mm;

(b) allowing an insulating film to be formed so as to cover said second principal plane of said semiconductor wafer;

(c) mounting said semiconductor wafer on a susceptor in a first single wafer processing unit so that the insulating film

on said second principal plane comes in contact with the susceptor; and

(d) forming a gate insulating film on said first principal plane within said first single wafer processing unit;

(e) mounting the semiconductor wafer having said gate insulating film formed thereon on a susceptor in a second single wafer processing unit so that the insulating film on said second principal plane comes in contact with the susceptor;

(f) forming a metal or a semiconductor on said gate insulating film within said second single wafer processing unit;

(g) mounting the semiconductor wafer having the metal or semiconductor formed thereon on a susceptor in a third single wafer processing so that the insulating film on said second principal plane comes in contact with the susceptor;

(h) selectively etching the metal or semiconductor within said third single wafer processing unit to form a gate electrode;

(i) holding the semiconductor wafer having said gate electrode formed thereon within a fourth single wafer processing unit; and

(j) cleaning said semiconductor wafer within said fourth single wafer processing unit.